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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

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in its capacity as elected Office

Date of mailing (day/month/year)

23 May 2000 (23.05.00)

International application No.

PCT/FI99/00827

Applicant's or agent's file reference

PAT077 PCT

International filing date (day/month/year)

05 October 1999 (05.10.99)

Priority date (day/month/year)

05 October 1998 (05.10.98)

Applicant

PENTTINEN, Jukka

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

20 April 2000 (20.04.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
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Facsimile No.: (41-22) 740.14.35

Authorized officer

Claudio Borton

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 22 NOV 2000

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|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Applicant's or agent's file reference PAT077 PCT | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/FI99/00827 | International filing date (day/month/year) 05.10.1999 | Priority date (day/month/year) 05.10.1998 |
| International Patent Classification (IPC) or national classification and IPC F 25 D 31/00, H 04 M 11/00 | | |
| Applicant Penttinen, Jukka | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Date of submission of the demand 20.04.2000 | Date of completion of this report 28.09.2000 |
| Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88 | Authorized officer Roland Landström/Els Telephone No. 08-782 25 00 |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI99/00827

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.

☐ the claims, Nos. _____, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. _____, filed with the letter of _____,
 Nos. _____, filed with the letter of _____.

☐ the drawings, sheets/fig _____, as originally filed,
 sheets/fig _____, filed with the demand
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

PCT/FI99/00827

1. Statement

Claims

2-3, 5, 7-9

YES

Claims

1.4.6

NO

Claims

Claims

1-9

YES

NO

Claims

1-9

YES

Claims

NO

..... /

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI99/00827

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

Document A (column 1, line 66 - column 8, line 48, figures 1 - 8) discloses a method for processing complete meals using a single cabinet (10) which comprises refrigerated storage compartments (17), means (25, 26, 31, 32) to transport the meals, a microwave oven (20), a delivery chute (34), push buttons (14) and display panels (15). The inventory and conditions, such as storage compartments temperature, can be determined from a remote location via a land-line such as public telephone (abstract and column 7, line 49 - column 8, line 48). Therefore, the invention claimed in claims 1, 4 and 6 lacks novelty.

In claims 2 - 3, 5 and 7 - 9 slight constructional variations are suggested that are obvious to a person skilled in the art, especially since similar features are known from documents B - E (see below). Consequently, the invention claimed in claims 2 - 3, 5 and 7 - 9 lacks an inventive step.

Document B (column 2, line 50 - column 11, line 15, figures 1 - 19) discloses an integrated refrigeration and rethermalization apparatus having controllers (76, 78, 100, 114).

Document C discloses a refrigerator that sends an order for food via the Internet, and a cooking range that is switched on from mobile computers.

Document D (column 3, line 23 - column 25, line 43, figures 1 - 5D5, abstract) discloses a system for measurement of intake of foods in the diet.

Document E (column 1, line 5 - column 4, line 15, figures 1 - 3) discloses a network for controlling various household units.

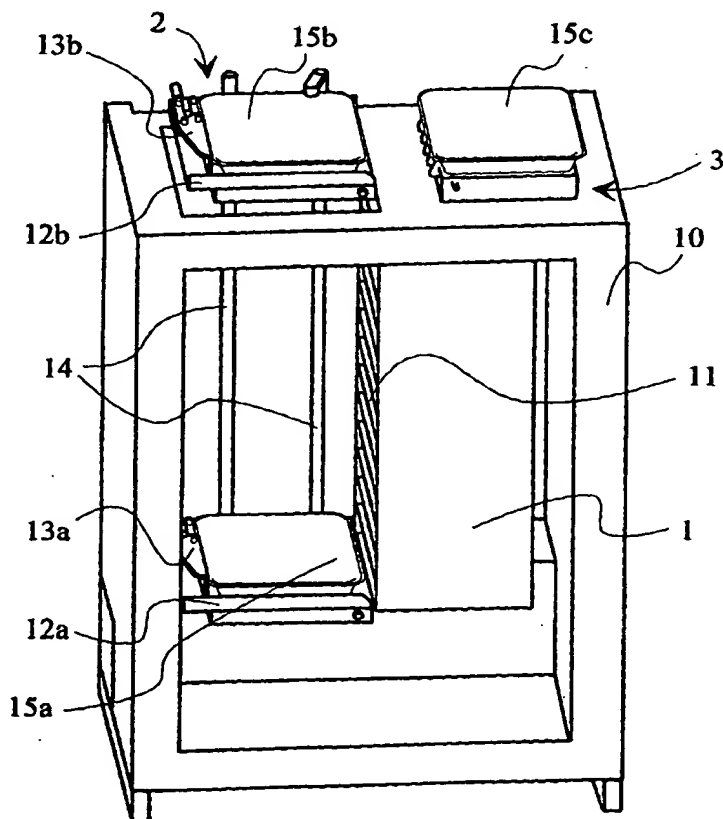


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (51) International Patent Classification ⁷ : F25D 31/00, H04M 11/00 | A1 | (11) International Publication Number: WO 00/20811 (43) International Publication Date: 13 April 2000 (13.04.00) |
| (21) International Application Number: PCT/FI99/00827 (22) International Filing Date: 5 October 1999 (05.10.99) (30) Priority Data: U980432 5 October 1998 (05.10.98) FI (71)(72) Applicant and Inventor: PENTTINEN, Jukka [FI/FI]; Tammisalonie 2 A 4, FIN-00830 Helsinki (FI). (74) Agent: JVP-PALVELU OY; Torikatu 4, FIN-05800 Hyvinkää (FI). | | (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |

(54) Title: METHOD AND APPARATUS FOR THE PROCESSING OF FOOD PORTIONS**(57) Abstract**

The present invention relates to a method and apparatus for the processing of food portions. According to the method the food portions are delivered to a single apparatus which comprises at least a cold storage space (1) and the heating unit (3) which are integrated into a single assembly which is controlled by means of a control centre (6) and a user interface (7). The apparatus is connected over a telecommunication network or alike with a supplier of foodstuffs or with some other organisation, such as a service and maintenance, or a main frame computer or a server computer where the information needed is stored. The selection and the heating of the food portions can be performed by remote activation of the apparatus over the telecommunication network.



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METHOD AND APPARATUS FOR THE PROCESSING OF FOOD PORTIONS

The present invention relates to a method as defined
5 in the preamble of claim 1, and an apparatus as defined in the preamble of claim 4, for the processing of food portions.

Traditionally, the processing of foodstuffs, especially foodstuffs for the domestic household, consists of making a trip to a grocery, storing the foodstuffs in a refrigerator or a deep-freeze and preparing food e.g. in an oven or a microwave oven. In practice, plenty of time is consumed in collecting
10 foodstuffs, and similarly preparing food from the foodstuffs requires many different devices and appliances which take up a lot of space and, because of their variety, form complex entities that are difficult to maintain, among other things. Moreover, there
15 are many groups of people, such as the old, handicapped and also children, who are unable to prepare a food portion for themselves using current methods and apparatus.

25 The object of the present invention is to change this traditional way of action by automating the chain of foodstuff processing for the preparation of daily food portions in a manner unknown so far. In this way, the amount of work needed for meals in homes,
30 institutions, such as old-age homes, and in small offices is reduced considerably. Likewise, making food is made easier and will be possible even for people who are unable or unwilling to prepare their own food. To achieve this object, the method according to
35 the invention is characterised by the features defined in the characterisation part of claim 1, and the apparatus according to the invention is charac-

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terised by the features defined in the characterisation part of claim 4. Other preferred embodiments of the invention are characterised by what is presented in the other claims.

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The solution of the invention has the advantage that it provides an easy and smooth as well as economical and labour-saving and space-saving method for foodstuff supply for in homes, institutions and small offices. This means that old and handicapped people as well as children will find it easy to prepare their food themselves. According to the invention, the preparation of food portions ready to be eaten is accomplished using a single apparatus which comprises spaces for the storage, heating and serving of food portions. Such an integrated apparatus allows easy heating and substantially reduces the work and labour required for the acquisition and preparation of food. The invention described here consists of a method and apparatus by means of which it is possible, depending on the application, to maintain a connection over a telecommunication network, such as an information network or a telephone network, with a supplier of foodstuffs or with some other organisation. The apparatus comprises spaces for cold storage and spaces for heating of food portions. The apparatus is supplied with foodstuffs in suitable amounts e.g. once a week. The foodstuffs are delivered as ready-made frozen food portions, which are stored in the cold spaces in the apparatus. When the user wants a meal, he/she activates the apparatus, whereupon, in accordance with a command given by the user, the apparatus selects the portion, heats it to a suitable temperature and delivers the heated portion on a delivery table provided in the apparatus. The solution of the invention additionally provides the advantage of making it easy to achieve control of nutrition level, so

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the users can themselves adjust their diet to get healthy food to their liking. A further advantage is that products can be easily identified e.g. using a bar code system.

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In the following, the invention will be described in detail by the aid of one of its embodiments with reference to the drawings, wherein

- 10 Fig. 1 presents the apparatus in the form of a block diagram, and
Fig. 2 presents an apparatus according to the invention in simplified form in an oblique front view.

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According to Fig. 1, frozen food portions are placed for storage into a cold storage space represented by block 1, which is held at a low temperature suited for the storage of frozen foodstuffs. The regulation
20 of temperature is implemented using refrigerating techniques known in themselves, by applying e.g. the compression or evaporation method. The humidity level in the storage space can also be regulated if necessary. The foodstuffs are packed as complete portions
25 and frozen. In a preferred embodiment of the invention, all food portions in the apparatus are stored at the same temperature. Block 2 represents a transfer mechanism used to transfer the food portion into a heating unit 3 functioning as a cooking compartment. The transfer mechanism may be implemented using
30 technology known in itself. The heating unit represented by block 3 heats the food portion to a uniform temperature suitable for the user by applying resistance heating or microwave heating technology or a
35 combination of these. The heating system may comprise temperature regulation or control of output power and thermal energy to allow desired temperatures to be

reached. A serving device, represented by block 4, makes it possible to bring the heated food portion to within the user's reach so as to make it as easy as possible for the user to take out the food portion from the machine. If necessary, the transfer mechanism also works between the heating unit and the serving device.

Block 9 is a data processing section, which comprises a telecommunication unit 5 containing the required data communication functions, a control centre 6 and a user interface 7. With present-day technology, the data processing section 9 can be implemented using a microcomputer. The microcomputer used may be a separate computer in the home or it may be a computer integrated with the apparatus of the invention. In the case of a separate computer, the apparatus comprises means for connecting the computer to the apparatus.

The telecommunication part of the system is implemented e.g. using an Internet connection via a telephone network 8. Telecommunication can be applied for ordering new foodstuffs from a foodstuff supplier. This function may be automated so that a new order is sent when the amount of foodstuffs falls below a set minimum. Ordering can also be effected manually, in which case the user defines via the microcomputer user interface the quantity and quality of foodstuffs to be delivered. The network connection can also be used to transmit information regarding possible faults in the apparatus as well as for sending a notification when the apparatus is about to run out of foodstuffs, and it can also be used for remote activation of the apparatus e.g. to select a food portion and to start heating. The remote activation is specially good for the old people or handicapped people

who cannot use the device alone. They can still live at home and the device is switched on via the remote activation in order to prepare a warm meal for them. For remote activation, it is also possible to use another microcomputer, through which the user can additionally see the number of food portions in the home or the like as well as the content of the portions. The remote activation can be used also for monitoring the functions of the apparatus. For instance to check what kind of food portions there are in the apparatus, or when the apparatus has been used, and to perform a fault diagnosis, etc. Information can be stored into the main frame computers of the telecommunication network or into the server computers. The storage is done via the telecommunication network. This is useful for foodstuff suppliers who can avoid investing to big computer solutions in their own offices. Instead they can use inexpensive computer solutions.

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Furthermore, a microcomputer provides a possibility for controlling the amounts and quality of nutrients in the foodstuffs, either automatically or by guiding the user. Control of nutrition level is easy to implement, so that when the user needs a diet, the computer will take care of realising it.

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Block 6 is a control centre and it functions as a controller of the automation of the apparatus. In modern computers, it is possible to add electronic circuit boards providing input and output connections for the control of other devices. Connections are provided from the control centre 6 to the food portion storage unit 1, to the transfer mechanism 2, to the heating unit 3 and to the serving device 4. The control centre 6 is further connected to the telecommunication unit 5 and to the user interface

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7. The user interface represented by block 7 can be implemented with facilities feasible in conjunction with the electronics, microcomputer or alike. These include e.g. a keyboard, a mouse and a touch-sensitive display screen as well as communication by speech.

Another very handy user interface is one based on cards or discs provided with illustrations of food portions. In this case, for instance, one side of the card is provided with a picture and/or designation of the food portion and the same side or the opposite side is provided with an identification marking based on bar code, magnetic stripe or equivalent, representing the same food portion. When the user inserts a card representing the desired food portion into the user interface of the apparatus, the apparatus will read the identification marking, prepare the food portion and mark the portion as consumed.

Fig. 2 illustrates the mechanical structure of an apparatus according to the invention, in a simplified form and in an oblique front view. In the figure, the cover part normally placed on the top of the apparatus and the heating unit that may be comprised in it as well as the door in the front wall of the apparatus have been omitted. The apparatus comprises a frame part 10, the interior of which comprises a cold storage space 1 with storage boxes 11 for packaged food portions 15. Mounted next to the cold storage space is a transfer mechanism 2, which comprises a transfer device 12, 13 for taking a food portion 15 from a storage box 11 and hoist guides 14 for hoisting the transfer device from the cold storage space to the upper part of the apparatus. Moreover, the upper part of the apparatus is

- provided with a heating unit 3, from which the user can take the food portion when it is ready to be eaten. The transfer device comprises a transfer pan 12, onto which the food portion is moved from the storage box 11, and a transfer gear 13, which is used to take the food portion out of the storage box 11 and also to move it to the heating unit 3 in the upper part of the apparatus.
- Fig. 2 shows the same food portion package 15 at three different stages and the position of the transfer device 12 at two different stages. At the first stage, the food portion 15 has just been taken from the storage box onto the transfer device 12a; at the second stage, the food portion 15b is lying on the transfer device 12b just before being moved into the heating unit; and at the third stage, the food portion 15c is in the heating unit 3.
- The products are identified on the basis of a bar code system or a magnetic stripe or equivalent, which has the advantage of definite markings that allow the system of the invention to reliably identify the foodstuffs brought into the apparatus. Based on an order, the foodstuffs are delivered directly into the apparatus from a delivery van of a food supply company or some other service organisation. In the home, the apparatus is placed in a suitable location, e.g. in the kitchen, as a stand-alone appliance or built in kitchen fittings, such as a work table. The small dimensions of the apparatus also allow it to be placed in a vestibule or living room.
- The user can regularly observe his/her nutrient supply, consumption habits, costs and other related matters by the information accumulated in a database

in the apparatus, and if desired, reports can be printed out on a printer connected to the apparatus.

It is obvious to the person skilled in the art that
5 the invention is not restricted to the examples described above but that it may be varied within the scope of the claims presented below. Thus, a preferred embodiment of the invention may be so implemented that the food portion is not moved but instead the temperature in its storage box is changed
10 during the heating of the food portion. This embodiment comprises no transfer mechanism. The storage space may also be divided into separate boxes. When the storage space has been divided into boxes, it
15 will be possible to store different food portions in different conditions regarding temperature and humidity. In this case, each box is adjusted separately if necessary. The operation may also be such that the final portion consists of several sub-
20 portions, which are processed by the apparatus by turns. In this case, no ready-made food portions are needed, but the components are stored in separate storage spaces, from where the apparatus only collects them and prepares a food portion at heating
25 time. The apparatus may also be so located that the deliverer of fresh supplies can place the foodstuffs into the apparatus using his own key, yet without having to enter the building. In this case, the apparatus is provided with a back door which opens directly to the outside of the building.
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CLAIMS

1. Method for the processing of food portions, in which method the food portions are delivered to a cold storage space (1) situated by a user, from said cold storage space the food portion wanted each time is moved in connection with the activation of the heating phase to a heating unit (3) where the food portion is heated, after which the food portion is ready for serving, characterised in that the preparation of food portions ready to be eaten is accomplished using a single apparatus which comprises at least a space for the cold storage, heating and serving of food portions, and which apparatus is connected when needed over a telecommunication network or alike with a supplier of foodstuffs or with some other organisation, such as a service and maintenance, or a main frame computer or a server computer where the information needed is stored.
2. Method as defined in claim 1, characterised in that the order for new food portions is done over the telecommunication network.
3. Method as defined in claim 1 or 2, characterised in that the selection and the heating of the food portions is performed when needed by remote activation of the apparatus over the telecommunication network.
4. Apparatus for the processing of food portions, said apparatus comprising at least a cold storage space (1) for the storage of food portions and a heating unit (3), characterised in that the cold storage space (1) and the heating unit (3) are integrated into a single assembly, which has been ar-

ranged to be controlled by means of a control centre (6) and a user interface (7).

5 5. Apparatus as defined in claim 4, characterised in that, in addition to the cold storage space (1), heating unit (3) and user interface (7), the apparatus comprises a telecommunication unit (5), which serves to provide communication with a supplier of food portions, a failure data monitoring party or
10 equivalent.

6. Apparatus as defined in claim 4 or 5, characterised in that the apparatus comprises a transfer mechanism (2), which has been arranged to transfer
15 food portions from the cold storage space into the heating unit and, if necessary, further to a serving device (4).

7. Apparatus as defined in claim 4, 5 or 6, characterised in that the apparatus comprises a data processing section (9), which has been arranged to function as a supervising element storing and distributing information and activating the functions of the
20 apparatus.

25 8. Apparatus as defined in any one of the preceding apparatus claims, characterised in that the apparatus is connected to a telecommunication network, such as a telephone network or internet(8), over
30 which the ordering of food portions, remote operation of the apparatus, transmission of failure information etc. have been arranged to be effected.

9. Apparatus as defined in any one of the preceding
35 apparatus claims, characterised in that the apparatus comprises a system for controlling the user's nutrition level and diet.

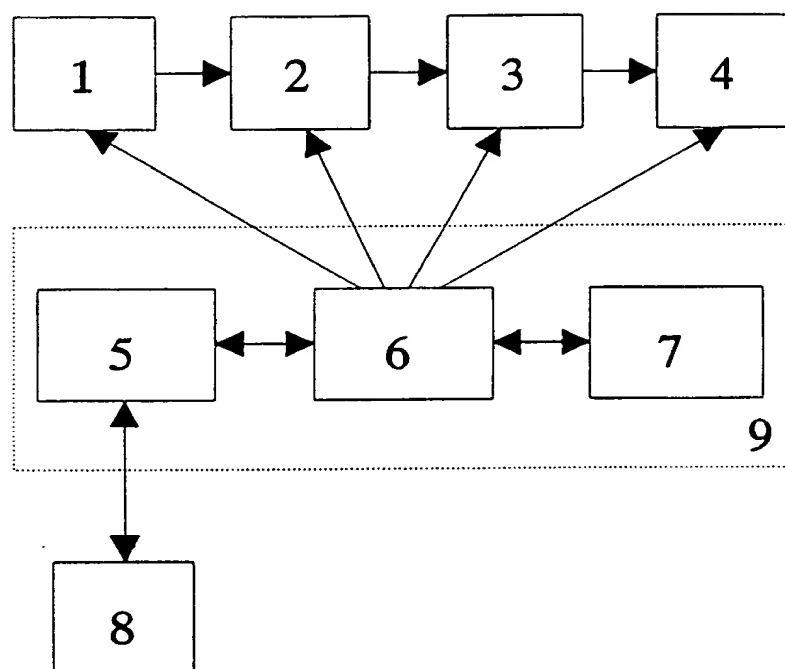


Fig. 1

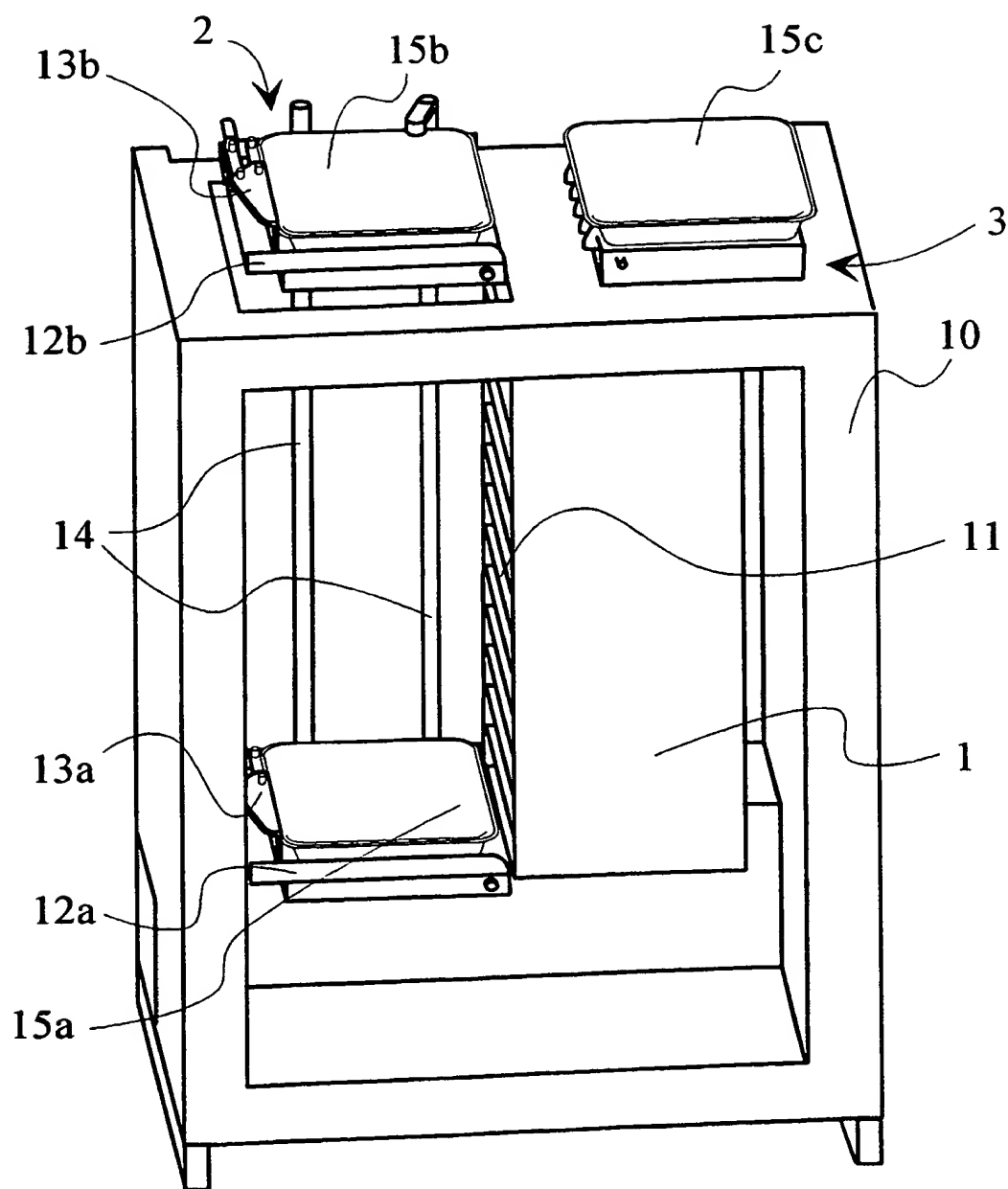


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/00827

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F25D 31/00, H04M 11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F25D, G06F, H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X | US 4398651 A (BEVERLY D. KUMPFER), 16 August 1983 (16.08.83), column 1, line 66 - column 8, line 48, figures 1-8 | 1,4-6,8 |
| Y | -- | 2,9 |
| X | US 5797445 A (JOHN WALTER WESTBROOKS, JR. ET AL), 25 August 1998 (25.08.98), column 2, line 50 - column 11, line 15, figures 1-19 | 1,3-4,7 |
| Y | -- | 2,9 |
| Y | Ny Teknik, Volume, No 48, 1997, Wallerius, Anders, "Styr din egen värld via Internet", page 40 - page 41, especially page 40 | 2 |
| | -- | |

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

31 January 2000

Date of mailing of the international search report

07 -02- 2000

Name and mailing address of the ISA/
Swedish Patent Office
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Facsimile No. +46 8 666 02 86

Authorized officer

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Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/00827

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| Y | US 5233520 A (MARY J. KRETSCH ET AL), 3 August 1993 (03.08.93), column 3, line 23 - column 25, line 43, figures 1-5D5, abstract -- | 9 |
| A | EP 0782117 A1 (LSI LOGIC CORPORATION), 2 July 1997 (02.07.97), column 1, line 5 - column 4, line 15, figures 1-3 ----- | 1-9 |

INTERNATIONAL SEARCH REPORT
Information on patent family members

02/12/99

International application No.
PCT/FI 99/00827

| Patent document cited in search report | | | Publication date | Patent family member(s) | Publication date |
|-------------------------------------------|---------|----|---------------------|----------------------------|---------------------|
| US | 4398651 | A | 16/08/83 | NONE | |
| US | 5797445 | A | 25/08/98 | US 5454427 A | 03/10/95 |
| | | | | US 5771959 A | 30/06/98 |
| | | | | US 5896915 A | 27/04/99 |
| | | | | US 5868195 A | 09/02/99 |
| US | 5233520 | A | 03/08/93 | NONE | |
| EP | 0782117 | A1 | 02/07/97 | JP 9200229 A | 31/07/97 |